



Seasonality of cryptosporidiosis: A meta-analysis approach

Author(s): Jagai JS, Castronovo DA, Monchak J, Naumova EN
Year: 2009
Journal: Environmental Research. 109 (4): 465-478

Abstract:

Objectives: We developed methodology for and conducted a meta-analysis to examine how seasonal patterns of cryptosporidiosis, a primarily waterborne diarrheal illness, relate to precipitation and temperature fluctuations worldwide. **Methods:** Monthly cryptosporidiosis data were abstracted from 61 published epidemiological studies that cover various climate regions based on the Köppen Climate Classification. Outcome data were supplemented with monthly aggregated ambient temperature and precipitation for each study location. We applied a linear mixed-effect model to relate the monthly normalized cryptosporidiosis incidence with normalized location-specific temperature and precipitation data. We also conducted a sub-analysis of associations between the Normalized Difference Vegetation Index (NDVI), a remote sensing measure for the combined effect of temperature and precipitation on vegetation, and cryptosporidiosis in Sub-Saharan Africa. **Results:** Overall, and after adjusting for distance from the equator, increases in temperature and precipitation predict an increase in cryptosporidiosis; the strengths of relationship vary by climate subcategory. In moist tropical locations, precipitation is a strong seasonal driver for cryptosporidiosis whereas temperature is in mid-latitude and temperate climates. When assessing lagged relationships, temperature and precipitation remain strong predictors. In Sub-Saharan Africa, after adjusting for distance from the equator, low NDVI values are predictive of an increase in cryptosporidiosis in the following month. **Discussion:** In this study we propose novel methodology to assess relationships between disease outcomes and meteorological data on a global scale. Our findings demonstrate that while climatic conditions typically define a pathogen habitat area, meteorological factors affect timing and intensity of seasonal outbreaks. Therefore, meteorological forecasts can be utilized to develop focused prevention programs for waterborne cryptosporidiosis. © 2009 Elsevier Inc. All rights reserved.

Source: <http://dx.doi.org/10.1016/j.envres.2009.02.008>

Resource Description

Early Warning System:

resource focus on systems used to warn populations of high temperatures, extreme weather, or other elements of climate change to prevent harm to health

A focus of content

Exposure :

weather or climate related pathway by which climate change affects health

Extreme Weather Event, Food/Water Quality, Food/Water Security, Precipitation, Temperature

Climate Change and Human Health Literature Portal

Extreme Weather Event: Drought, Flooding

Food/Water Quality: Pathogen

Temperature: Extreme Heat, Fluctuations

Geographic Feature: ☐

resource focuses on specific type of geography

Desert, Tropical, Other Geographical Feature

Other Geographical Feature : Mid-latitude; Cold-temperate

Geographic Location: ☐

resource focuses on specific location

Global or Unspecified

Health Impact: ☐

specification of health effect or disease related to climate change exposure

Infectious Disease, Morbidity/Mortality

Infectious Disease: Foodborne/Waterborne Disease

Foodborne/Waterborne Disease: Cryptosporidiosis

Population of Concern: A focus of content

Population of Concern: ☐

populations at particular risk or vulnerability to climate change impacts

Children

Other Vulnerable Population: Immunocompromised

Resource Type: ☐

format or standard characteristic of resource

Research Article, Review

Timescale: ☐

time period studied

Time Scale Unspecified